TMDL Project Closeout Report

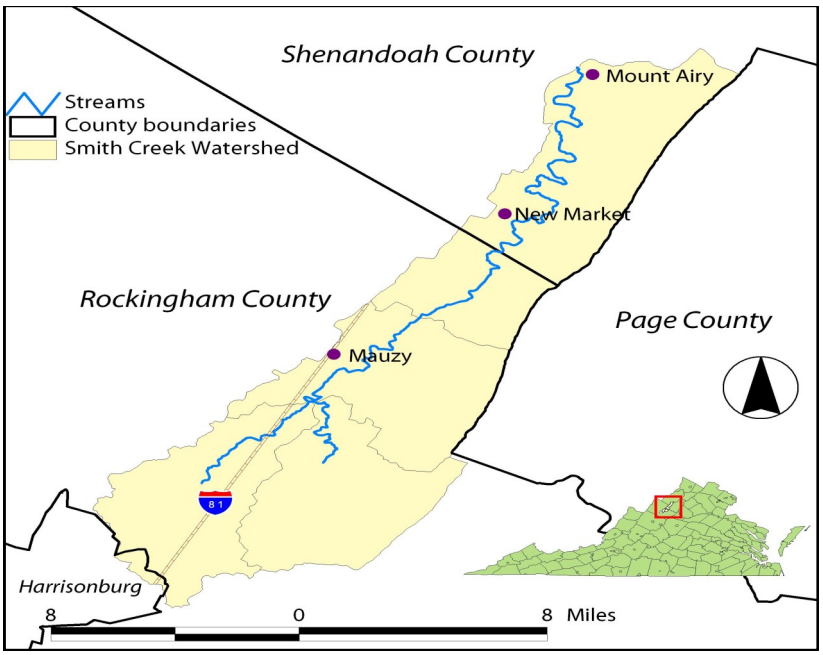
SMITH CREEK WATERSHED

Rockingham and Shenandoah Counties

Virginia Nonpoint Source MANAGEMENT PROGRAM

Project Location and Background

The Smith Creek watershed is located in the Potomac River Basin in Shenandoah and Rockingham Counties, Virginia, with a small portion of the headwaters located in the City of Harrisonburg, Virginia. The watershed is 67,900 acres in size and land use is predominantly forested and agricultural. Smith Creek was first listed as impaired on the Virginia's *1998 and 2002 Section 303(d) Total Maximum Daily Load (TMDL) Priority List and Report* due to violations of the State's Water Quality Standards for fecal coliform bacteria and violations of the General Standard (benthic). The Smith Creek TMDLs were approved by US Environmental Protection Agency (EPA) in June 2004. A stressor analysis was performed during development of the benthic TMDL, and sediment was identified as the primary stressor causing the aquatic life use impairment in Smith Creek. A TMDL implementation plan was completed for Smith Creek in February 2009. Shortly after completion of the implementation plan, Smith Creek was designated as a Showcase Watershed by Natural Resources Conservation Service (NRCS). In 2013, two sub-watersheds (including Mountain Run) were selected for the National Water Quality Initiative (NWQI) as part of the partnership between NRCS and the EPA. In 2013, a 319(h)-funded project was initiated to address septic and urban issues.



Implementation Highlights

The Smith Creek TMDL implementation project was administered by the Shenandoah Valley Soil and Water Conservation District (SVSWCD). The project closed on June 30, 2015. EPA 319 grant funds were provided to the SVSWCD to implement residential septic, stormwater and pet waste components of the implementation plan (IP). An extensive partnership was formed with other regional conservation organizations including USDA-NRCS and the Chesapeake Bay Foundation to address agricultural BMP implementation goals for the watershed. This effort was a part of the Showcase Watershed Initiative. The table on the right shows BMPs implemented in the watershed since the project began and overall implementation goals. (continued on page 2)

Table 1: Smith Creek BMP Summary: January 2012—June 2016

Control Measure	Units*	Goal	Installed	%
Agricultural				
Livestock Exclusion	F	913,150	37,786	4
Riparian Buffers (pasture)	A	436	32	7
Pasture Management	A	20,235	103	1
Critical Area Stabilization	A	3	1	33
Vegetative Cover on Cropland	A	N/A	57	N/A
Reforestation of Erodible Crop and Pastureland	A	22	4	18
Streambank Stabilization	F	N/A	720	N/A
Manure Storage Facility	S	8	12	150
Urban/Residential				
Pet Waste Program	P	1	1	100
Pet Waste Stations	S	N/A	6	N/A
Vegetated Buffer	A	44	0	0
Rain Gardens	A	109	0	0
Bioretention Filters/Bioswales	A	45	102	227
Residential Septic				
Septic Tank Pump-out	S	1,108	200	18
Connection to Public Sewer	S	7	0	0
Septic System Repair	S	8	21	263
Septic System Installation	S	19	4	21
Alternative Waste Treatment System	S	70	3	4

A = Acres, F = Linear Feet, P = Program, S = System

Implementation Highlights— Continued

Agricultural BMP implementation continued in FY 2016, despite the conclusion of the EPA 319 funded component of the implementation project. Between July 2015 and June 2016, the SVSWCD utilized VA Agricultural Cost-Share Program and Conservation Reserve Enhancement Program funds to complete 5 livestock exclusion projects totaling 8,241 linear feet of stream fencing. In addition, 37 acres of long term vegetative cover on cropland and 381 acres of small grain cover crops were planted. An animal waste control facility was also installed.

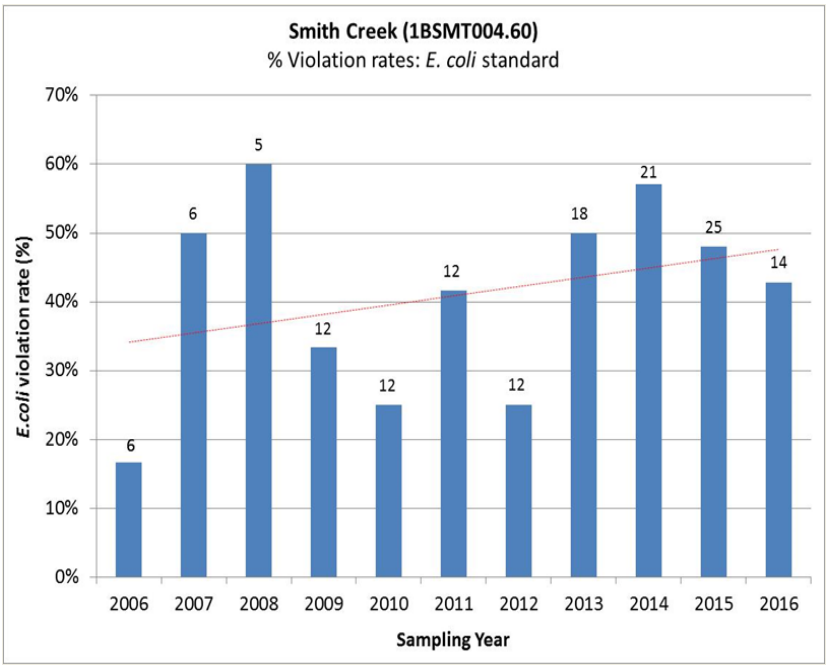
The residential septic and urban program was very successful from the start, due in part to extensive outreach efforts made by the SVSWCD. This project included a series of bioretention filters and wetland treatment cells receiving and treating stormwater runoff from a drainage area of 102 acres. This project was completed in partnership with the Center for Watershed Protection and includes new and innovative techniques for stormwater management. Outreach in support of this project was extensive. To promote the pet waste and septic programs, six postcard mailings to landowners were completed, eight newsletters were produced, a Smith Creek website was developed, and eight outreach events were held. Pollution reductions resulting from these BMP installations and those since the project's inception are summarized in the table below.

Time Period	Pathogens - Coliform (CFU)	Nitrogen (lbs/year)	Phosphorus (lbs/year)	Sedimentation (tons/year)
January 2012-June 2016	4.89E+15	15,303	7,026	32,415

Table 2: Pollution Reductions for Smith Creek: January 2012—June 2016

Water Quality Monitoring Results

Water quality data collected by DEQ for the period of 2006 through 2016 were analyzed to determine the impact of BMPs implemented in the project area on *E. coli* violation rates and associated trends, if any, in water quality improvements. The bar graph to the right shows the percent violation rate for samples collected annually at monitoring station 1BSMT004.60 near the mouth of Smith Creek that did not meet the water quality standard of 235 cfu/100 ml. The number of samples collected each year is shown above each bar. The linear regression fitted to the data shows a possible increasing trend in violation rates over the sampling period, indicating a lack of improvement in water quality in the greater Smith Creek watershed. However, both 2015 and 2016 data collected to date show some signs of improvement.



Graph 1: Water Quality Data for Smith Creek 2006-2016 (1BSMT004.60)

The Virginia Nonpoint Source Management Program: The Virginia NPS Management Program is managed by the Virginia Department of Environmental Quality (DEQ) and is funded, in part, through grants from the U.S. Environmental Protection Agency, under the Clean Water Act Section 319(h). For more information regarding Virginia's Nonpoint Source Management Program, please visit us on the web at: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/NonpointSourcePollutionManagement.aspx . An electronic copy of this report can be found here: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLImplementation/TMDLImplementationProjects.aspx General NPS Program questions? email: npsgrants@deq.virginia.gov

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Project Funding

A total of $478,348 in residential septic and agricultural BMP cost-share was provided to landowners in the watershed between January 2012 and June 2016. These funds were provided through a Section 319(h) grant, and through the VA Agricultural Cost-share and Conservation Reserve Enhancement Programs. Additional federal cost share funds were provided to landowners through other USDA-NRCS programs including EQIP. These values are not included in the total reported above. A total of $88,521 of Section 319 funds were used to design and install stormwater management and pet waste BMPs. This grant also provided $76,562 in technical assistance funding to the Shenandoah Valley SWCD. A total of $118,828 in project match was reported by the SVSWCD for this grant.

Photos 1-3: (Upper Right) Septic System Installations; (Lower Right and Left) Bioswale installation

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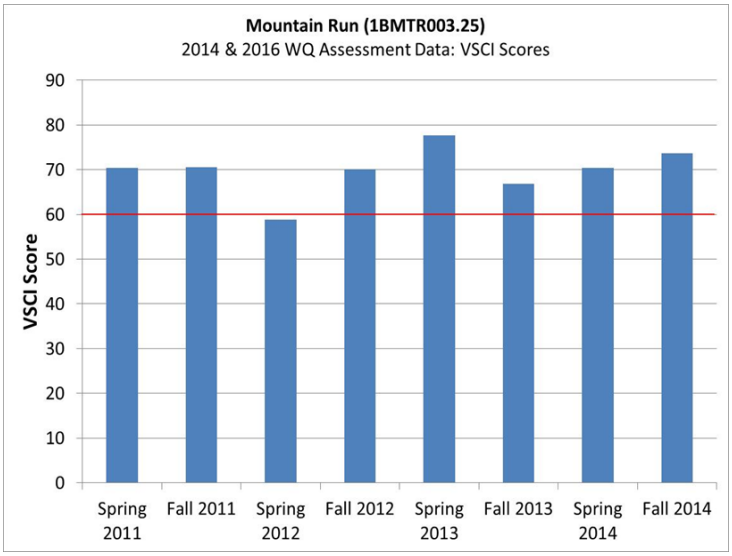
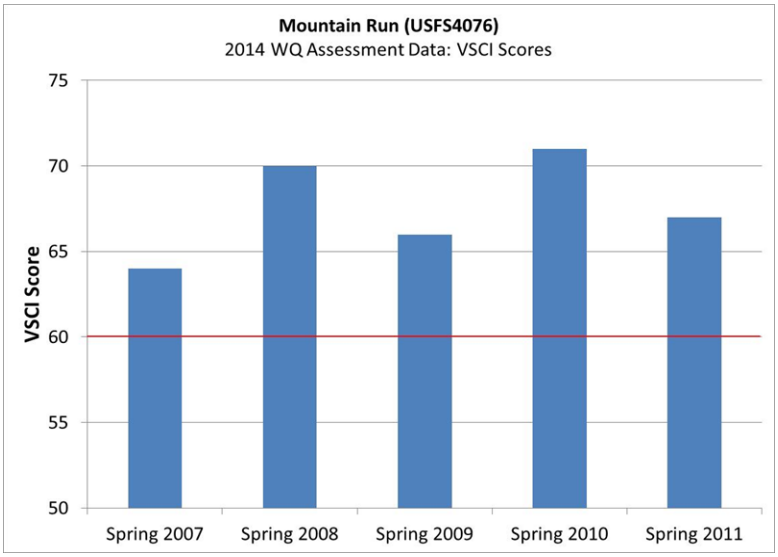
Water Quality Improvements and Success Stories

Two segments of Mountain Run (5.94 miles and 0.95 miles), a subwatershed of Smith Creek, were listed as impaired on Virginia's *Section 303(d) TMDL Priority List and Report*. The impaired segments were listed due to violations of the State's Water Quality General Standard for aquatic life. Installing agricultural BMPs in the watershed helped improve benthic macroinvertebrate communities, allowing the Commonwealth of Virginia to remove both listed segments of Mountain Run from its list of impaired waters in 2014. Agricultural BMPs installed in the Mountain Run sub watershed from 2002 to 2012 reduced sediment loadings, which was identified as the primary stressor to the benthic community in the Smith Creek TMDL study. Biological monitoring conducted by the DEQ at station 1BMTR003.25 in 2011 and 2012 indicated an improvement in the benthic macroinvertebrate community (Figure lower left) Water quality data collected at United States Forest Service (USFS) station 4076 also showed improvements beginning in 2007 (figure lower right). Based on these improvements, the two segments (5.69 miles and 0.95 miles) of Mountain Run were removed from the state's impaired waters list in the 2014 Water Quality Assessment 305(b)/303(d) Integrated Report. DEQ has prepared a success story describing the BMPs that were implemented in the watershed, the technical assistance that was provided to landowners, and the resulting water quality improvements.





Graphs 2 and 3: Benthic Water Quality Data for the Mountain Run sub-watershed of Smith Creek. Stations 1BMTROO3.25 (left) and USFS4076 (right). Photo 4: (Lower Right) Pet waste bag station installed at local park

For More Information Please Contact:

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